**What is claimed is:**

1. A polishing apparatus comprising:

a rotatable turntable having a polishing pad;

a carrier head configured to cooperate with the polishing pad to hold a target workpiece to be polished in alignment with the polishing pad on the turntable; and

a magnetic field control unit comprising a plurality of spaced apart first magnetic field sources disposed inside the carrier head, for generating respective first magnetic forces, and a plurality of second magnetic field sources disposed inside the carrier head configured to generate respective second magnetic forces, a respective one of the plurality of second magnetic field sources being substantially spatially aligned with a respective one of the first magnetic field sources to define a magnetic field source pair, each magnetic field source pair being spaced apart from the others, wherein, in operation, the second magnetic field source in each magnetic field source pair is configured to selectively repel or attract the first magnetic field source.

2. The apparatus according to claim 1, wherein the first magnetic field sources each comprise at least one permanent magnet, and wherein the second magnetic field sources each comprise an electromagnet.

3. The apparatus according to claim 1, wherein the first magnetic field sources are held lower in the carrier head than the second magnetic field sources, with the second magnetic field source for each magnetic field source pair being positioned axially aligned with and above the corresponding first

magnetic field source.

4. The apparatus according to claim 1, wherein the second magnetic field sources reside lower in the carrier head than the first magnetic field sources, with the first magnetic field source for each magnetic field source pair being positioned axially aligned with and above the corresponding second magnetic field source.

5. The apparatus according to claim 1, wherein the first magnetic field sources are substantially concentrically aligned with: a center permanent magnet; an intermediate permanent magnet surrounding an outer peripheral edge of the center permanent magnet; and an outer permanent magnet surrounding an outer peripheral edge of the intermediate permanent magnet, and wherein the second magnetic field sources are substantially concentrically aligned with a center electromagnet; an intermediate electromagnet arranged to surround an outer peripheral edge of the center electromagnet; and an outer electromagnet arranged to surround an outer peripheral edge of the intermediate electromagnet.

6. The apparatus according to claim 5, wherein an insulating material, film and/or coating is positioned between adjacent magnetic field source pairs to substantially magnetically insulate the different magnetic field pairs from each other.

7. The apparatus according to claim 1, further comprising:

a polishing film thickness detector unit with a plurality of spaced apart sensors positioned proximate a polishing surface of the target workpiece for detecting a thickness of a polishing film of the target workpiece, the polishing film thickness detector unit operatively associated with the magnetic field control unit; and

a magnetic force adjustment unit configured to selectively control the polarity and/or magnetic force generated by each of the second magnetic field sources responsive to the detected thickness of the polishing film provided by the polishing film thickness detector unit.

8. A polishing method using a carrier head configured to house a first magnetic field source and a second spatially aligned magnetic field source, comprising:

generating a repellant or attractant magnetic force between the first and second magnetic field sources;

rotating a turntable that is cooperably aligned with the carrier head, with an object to be polished positioned therebetween, in a predetermined direction, with the carrier head configured to apply pressure against the object in a direction toward the turntable; and

controlling the pressure applied to the object by the carrier head using the generated repellant or attractant magnetic forces.

9. A method according to claim 8, wherein the second magnetic field source comprises an electromagnet and the first magnetic field source comprises a permanent magnet.

10. A method according to claim 9, further comprising adjusting current delivered to the electromagnet to control the intensity or strength of the generated repellant or attraction magnetic field force.

11. A method according to claim 8, further comprising changing the current flow direction in the electromagnet to generate the desired attractant or repellant magnetic field force.

12. A carrier head assembly for a polishing system adapted to engage a target workpiece to expose a target surface thereof for polishing, comprising:

a carrier head body;

a plurality of permanent magnets held in the carrier head body, the permanent magnets configured to generate respective magnetic forces; and

a plurality of electromagnets held in the carrier head body, the electromagnets configured to generate respective magnetic forces, each electromagnet configured and positioned in the carrier head body so that, in operation, a respective electromagnet magnetic force adjusts a net magnetic force generated by the combination of the respective electromagnet and at least one of the permanent magnets, whereby the carrier head is configured to generate adjustable magnetic forces that exert pressure on a surface of a target workpiece.

13. An assembly according to claim 12, further comprising a power

source in communication with the plurality of electromagnets, and a plurality of electrical paths, at least one extending between each electromagnet and the power source.

14. An assembly according to claim 13, wherein the electrical paths include two leads extending between the power source and each electromagnet.

15. An assembly according to claim 12, wherein the carrier head assembly is adapted to hold a semiconductor wafer in alignment with a polishing pad on a turntable.

16. An assembly according to claim 13, further comprising a magnetic force adjustment unit in communication with the power source, wherein the magnetic force adjustment unit is configured to control the amount and direction of current transmitted to each electromagnet.

17. An assembly according to claim 13, wherein the electromagnets are mounted above the permanent magnets in the carrier head body.

18. An assembly according to claim 13, wherein the permanent magnets and the electromagnets are configured to define a plurality of spatially separated magnet pairs, the magnet pairs including at least one permanent magnet and at least one electromagnet held in the carrier head body in substantially axial alignment.

19. An assembly according to claim 12, wherein the permanent magnets include three spaced apart magnets that are substantially concentrically aligned.

20. An assembly according to claim 19, wherein the three permanent magnets that are substantially concentrically aligned are configured with: a center permanent magnet; an intermediate permanent magnet surrounding an outer peripheral edge of the center permanent magnet; and an outer permanent magnet surrounding an outer peripheral edge of the intermediate permanent magnet.

21. An assembly according to claim 20, wherein the electromagnets include three electromagnets that are substantially concentrically aligned: a center electromagnet; an intermediate electromagnet arranged to surround an outer peripheral edge of the center electromagnet; and an outer electromagnet arranged to surround an outer peripheral edge of the intermediate electromagnet.

22. An assembly according to claim 21, wherein the center electromagnet is substantially axially aligned with and disposed above the center permanent magnet, the intermediate electromagnet is substantially axially aligned with and disposed under the intermediate permanent magnet, and the outer electromagnet is substantially axially aligned with and disposed under the outer permanent magnet.

23. An assembly according to claim 12, wherein the carrier head body comprises a plurality of elongate cavities, each sized to secure a magnet pair including a first electromagnet and a first at least one permanent magnet axially spaced apart so that, in operation, the respective net magnetic force is generated in a substantially downward direction.

24. An assembly according to claim 23, further comprising a magnetically insulating material disposed between adjacent magnet pairs to inhibit magnetic field influence from neighboring magnets in other magnet pairs.

25. An assembly according to claim 16, further comprising a polishing film detector unit in communication with the magnetic force adjustment unit, the polishing film detector unit comprising a plurality of spaced apart sensors that are configured to detect the polishing thickness on the target polishing surface of the workpiece, wherein the current transmitted to each of the electromagnets is dynamically adjusted responsive to the detected thickness.

26. A polishing system for polishing a coating, film or other target surface material on a semiconductor substrate, comprising:

means for applying a plurality of spatially separate magnetic forces arranged to cover greater than a major portion of a rear surface area of a semiconductor substrate to force the semiconductor substrate toward a polishing device; and

means for individually dynamically adjusting the strength of the applied magnetic forces.

27. A polishing system according to claim 26, further comprising a plurality of polishing film thickness sensors configured to measure a film thickness on a polishing surface of the semiconductor substrate; and means for automatically relaying the measured thicknesses to the means for adjusting the strength of the applied magnetic forces.

28. A polishing system according to claim 26, wherein the means for applying magnetic forces comprises a plurality of electromagnets in communication with respective permanent magnets, and wherein the means for dynamically adjusting comprises increasing current transmitted to a selected electromagnet to increase the applied magnetic force and/or decreasing current transmitted to a selected electromagnet to decrease the applied magnetic force.

29. A polishing system according to claim 26, wherein the means for applying magnetic forces comprises a plurality of electromagnets in communication with respective permanent magnets, and wherein the means for dynamically adjusting comprises altering the polarity of a magnetic field generated by a selected electromagnet to repel or attract the permanent magnet to increase or decrease the respective applied magnetic force.

30. A method of applying pressure to a target workpiece undergoing

polishing using a carrier head, comprising:

generating a plurality of individually adjustable magnetic forces at a plurality of spaced apart locations across a lower surface of a carrier head; and

pressing against a rear surface of a target workpiece with the plurality of separately generated magnetic forces.

31. A method according to claim 30, further comprising dynamically selectively adjusting the magnetic forces based on substantially real-time feedback of a polishing thickness measured at a plurality of different locations on the polishing surface of the target workpiece.

32. A method according to claim 30, wherein the step of generating the individually adjustable magnetic forces comprises, for each individually adjustable magnetic force:

aligning at least one permanent magnet with an electromagnet;

powering the electromagnet to increase or decrease a net magnetic field strength generated by the combination of the electromagnet and the at least one permanent magnet and/or to selectively repel or attract the permanent magnet to thereby adjust the net magnetic field applied to the target workpiece.

33. A method according to claim 32, wherein the generating step comprises:

generating at least three concentrically arranged adjacent magnetic

forces which cover substantially all of a circular region about a rear surface of the target workpiece.

34. A method according to claim 30, wherein the plurality of individually adjustable magnetic forces include three concentrically configured electromagnets, a center electromagnet, an intermediate electromagnet surrounding the center magnet, and an outer electromagnet surrounding the intermediate magnet, with an insulating material positioned between each of the center, intermediate, and outer electromagnets.

35. A computer program product for controlling pressure applied by a carrier head to a rear surface of a workpiece with a target front surface being polished, comprising:

a computer readable medium having computer readable program code embodied therein, the computer readable program code comprising:

computer readable program code configured to individually selectively control current input to each of a plurality of different electromagnets held in a carrier head to adjust a magnetic force applied to the workpiece by the carrier head.

36. A computer program product according to claim 35, further comprising computer readable program code configured to individually selectively control the polarity of a magnetic field generated by each of a plurality of different electromagnets held in a carrier head.

37. A computer program product according to claim 36, further comprising computer readable program code for automatically receiving polishing thickness measurement data from a plurality of locations across the target surface of the workpiece, and wherein the computer program code is configured to increase or decrease current transmitted to respective electromagnets responsive to polishing thickness measurement data.

38. A computer program product according to claim 35, further comprising computer readable program code for automatically adjusting the current supplied to the electromagnets to cause the a respective electromagnet to selectively repel or attract an underlying permanent magnet.